Southeastern Wisconsin

Regional Planning Commission

Location: SEWRPC

1st Aquatic Habitat Subcommittee Meeting
of the Natural Areas Technical Advisory Committee Plan:
2020 update

January 29, 2020

Scope/Schedule

2020: (June)

- **Develop a Revised Lake & Stream Classification Scheme**
- Address issues with critical species habitat sites/data and sources

2021:

- Update Lake & Stream site inventory.
  - (Quantify historic loss, to extent practical)
- Produce Watershed-based site profile summaries
- Develop/update any supplementary information outside of site profiles (e.g. the list of regionally uncommon species, management decision making tools)
- Decide what level of site mapping can be published.
- Grapple with the reality of management needs and incorporate those into our concept of protection.

2022:

- Complete revised Plan & Recommendations
- Watershed-based site profile summaries published online
- Provide information through online data viewer with links to site attributes and site profiles

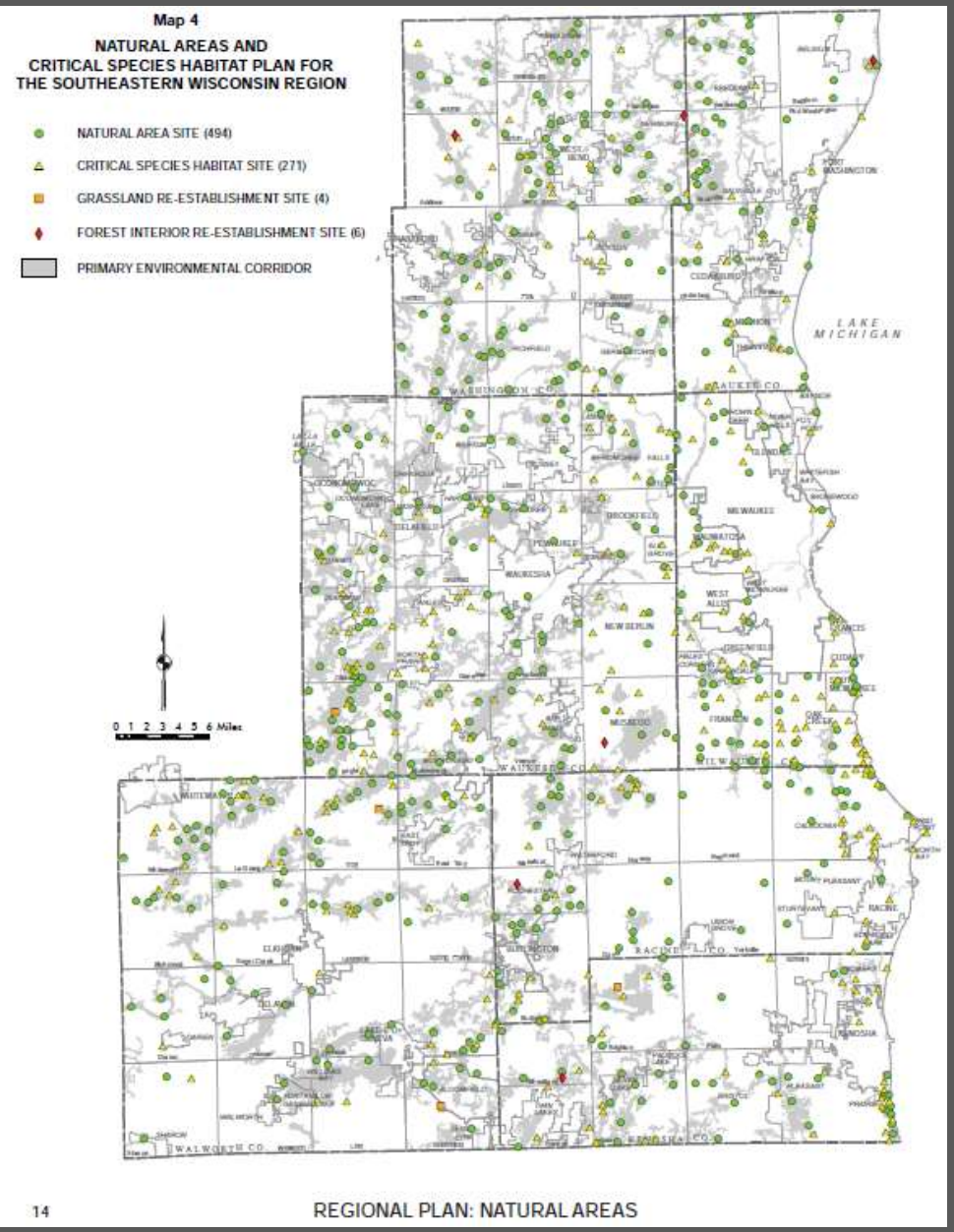
Background

August 1989-Natural Area Protection and Management Planning Program Prospectus—Identified 3 serious problems:

1. Loss of significant natural areas
2. Loss of rare, threatened, and endangered species
3. Need to identify and delineate natural areas and critical habitats for rare, threatened, and endangered species

Purpose is to guide the identification, protection, and management of high-quality natural areas and critical species habitats in Southeastern Wisconsin *"….thus contributing to the maintenance and restoration of the natural beauty of the Region and to the quality of life and the maintenance of biotic diversity within the Region."(page 6)*

Background



494 Natural Areas Cover 101 Square Miles as of 2010

"Tracts of land or water so little modified by human activity, or which have sufficiently recovered from the effects of such activity, that they contain intact native plant and animal communities believed to be representative of the pre-European-settlement landscape."

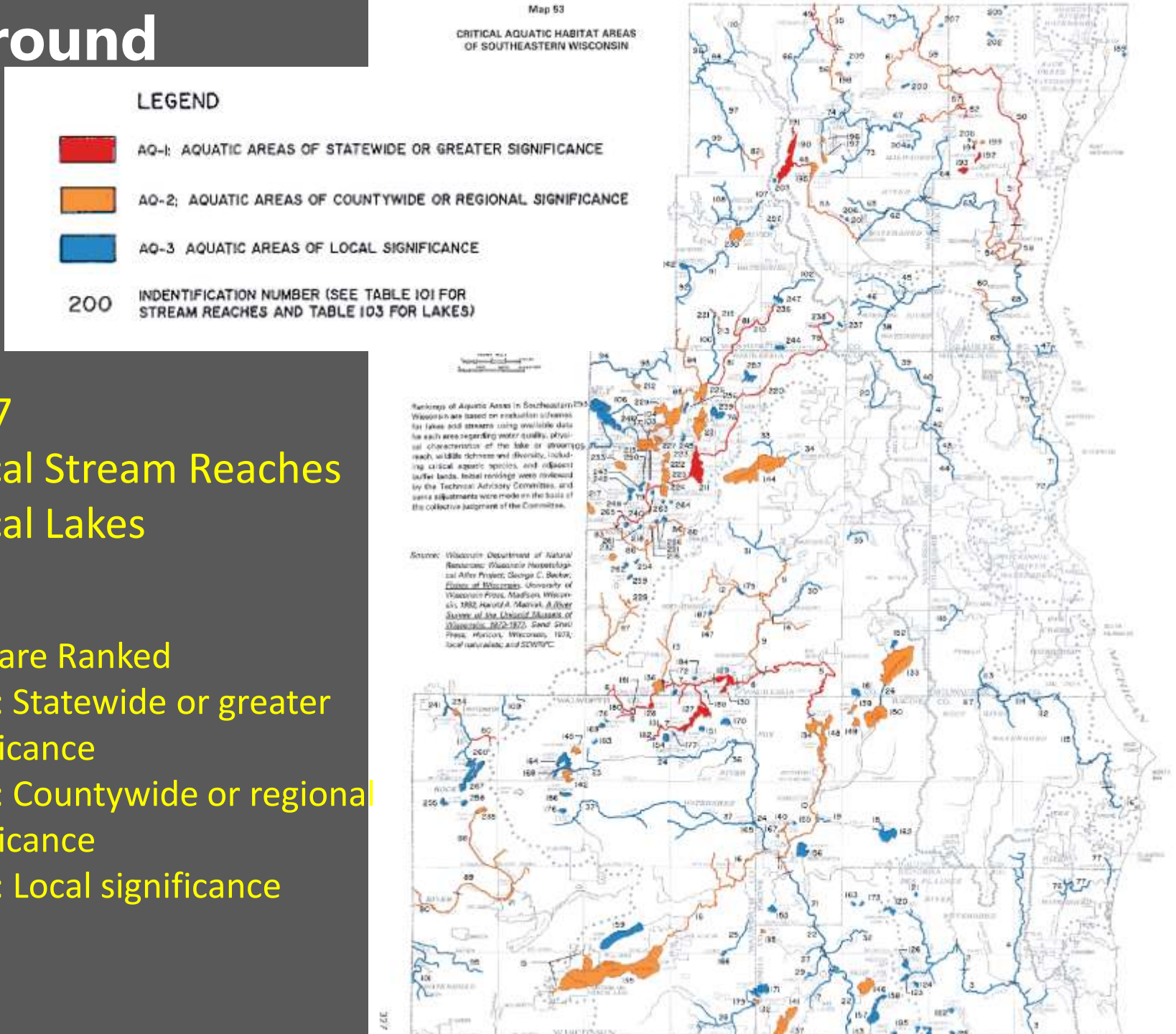
Land Sites are Ranked

- NA-1: Statewide or greater significance
- NA-2: Countywide or regional significance
- NA-3: Local significance

Factors in ranking and designation include:

- Biodiversity
- Natural communities present and their rarity
- Structural and ecological integrity
- Extent of human disturbance

Background



Year-1997

118 Critical Stream Reaches

148 Critical Lakes

Water Sites are Ranked

- AQ-1: Statewide or greater significance
- AQ-2: Countywide or regional significance
- AQ-3: Local significance

1997-Stream Assessment Criteria

Water Quality

Chemical Data[a]

+3: No water quality problems documented
+1: No more than one water quality problem
0: Sufficient data not available
-1: Two water quality problems
-2: Three water quality problems
-3: Four or more water quality problems

Physical Data

+2: Low streambed sedimentation
0: Moderate streambed sedimentation or data not available
-2: High streambed sedimentation

Impairment Status

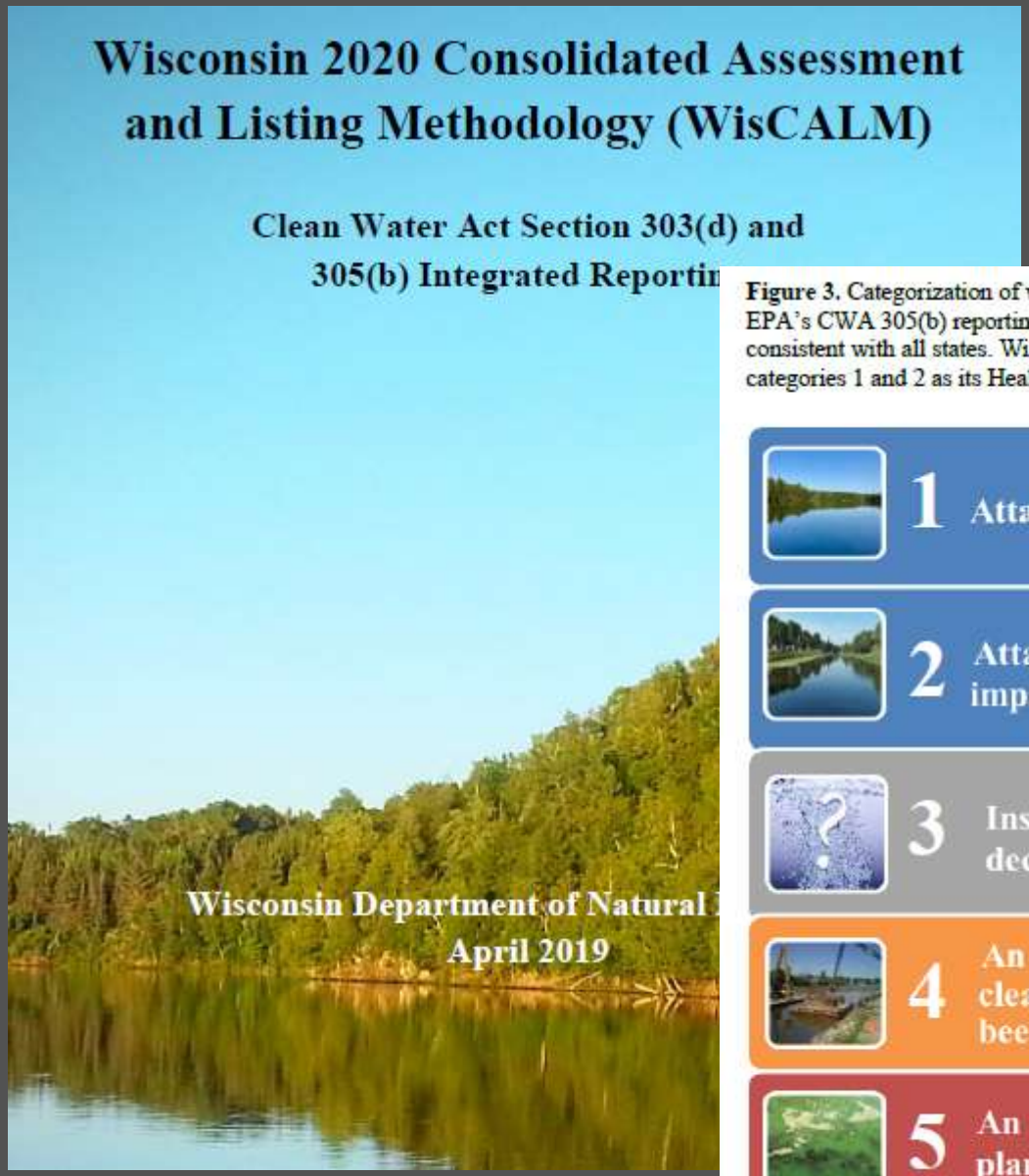
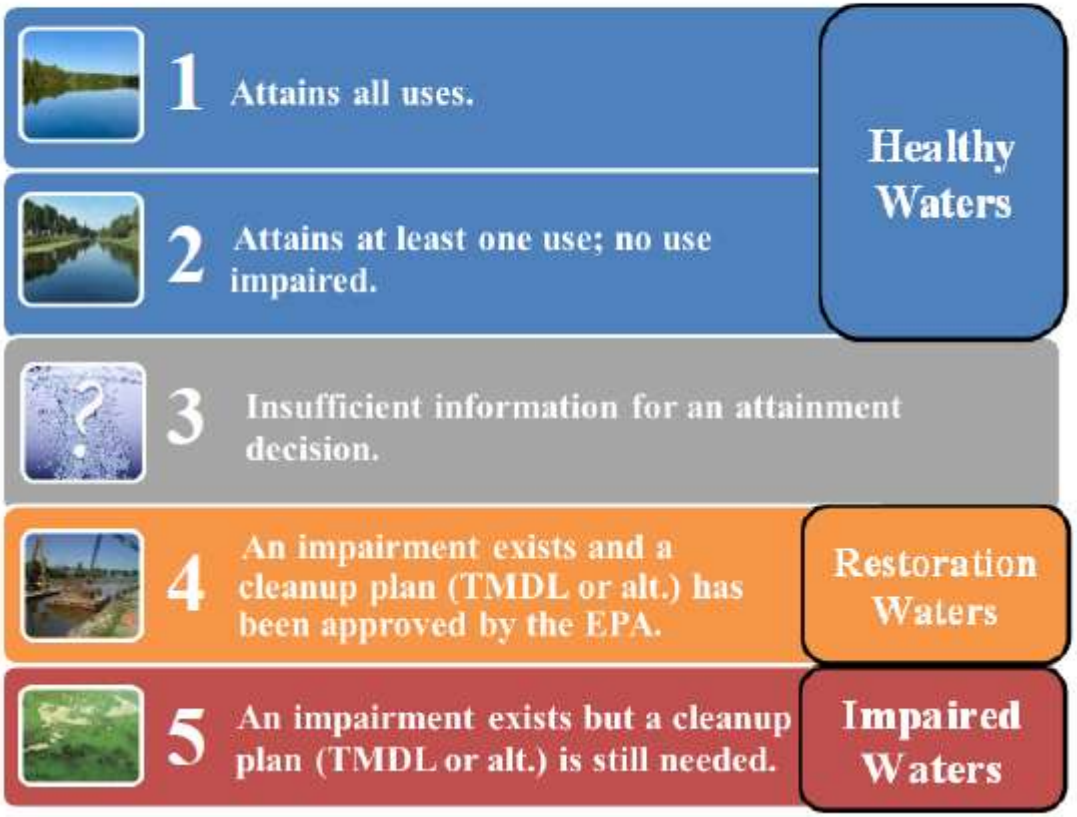


Figure 3. Categorization of waterbodies based on water quality assessments. Categories 1 – 5 align with EPA's CWA 305(b) reporting categories. Impaired waters are defined as those in category 5, which is consistent with all states. Wisconsin defines category 4 waters as its Restoration Waters List and waters in categories 1 and 2 as its Healthy Waters List.



Stream Assessment Criteria

Physical Characteristics

Channel Modifications[b]

+2: No physical modifications to the channel
+1: Few modifications to the channel
0: Moderate modifications to the channel
-1: Major modifications to the channel

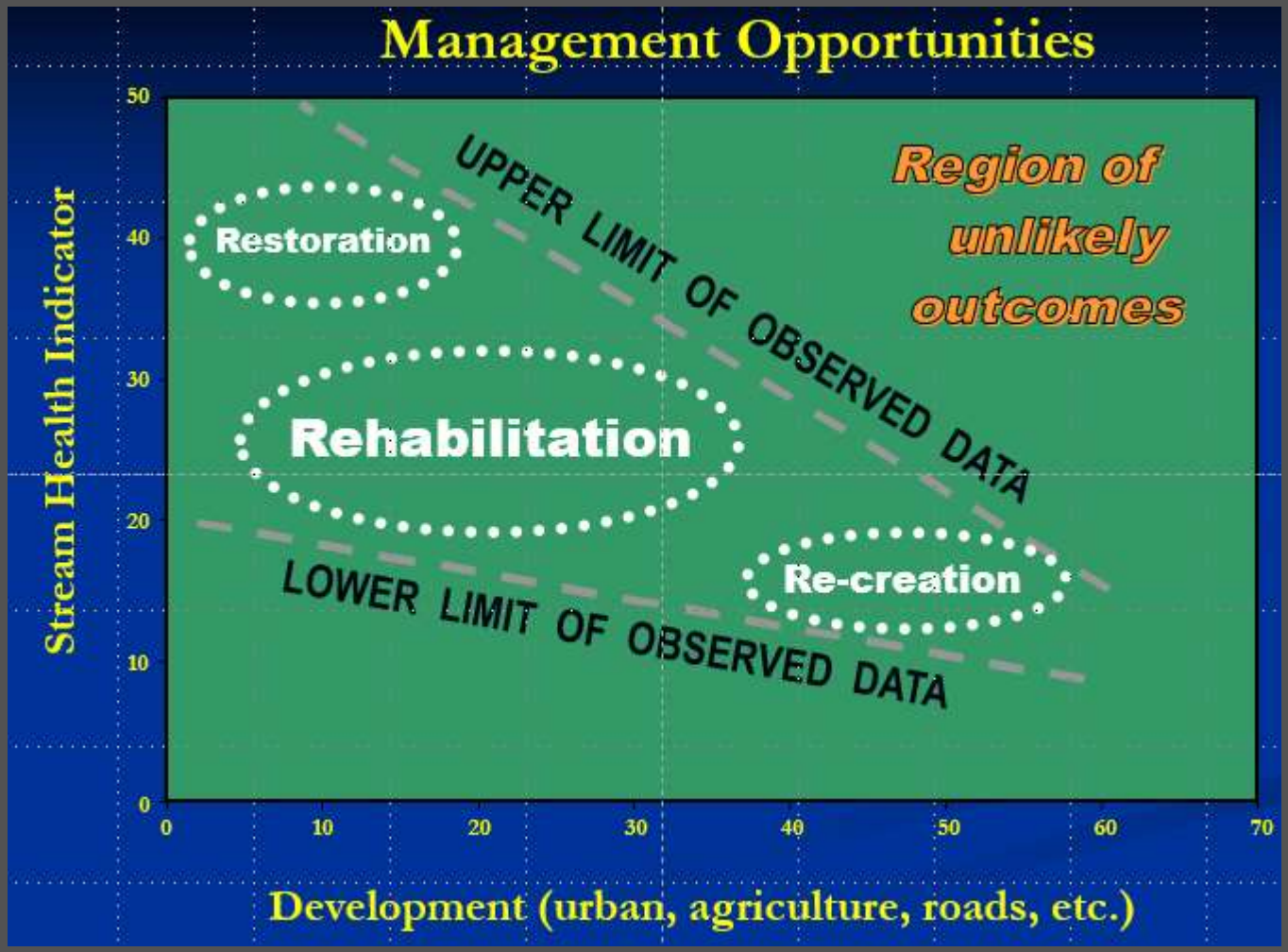
Total Reach Length

+2: Stream reach length (including adjacent critical stream reach
+1: Stream reach length 10 to 15 miles
0: Stream reach length less than 10 miles

Connection with Critical Aquatic Areas

+2: Connection with critical aquatic areas on both the upstream
+1: Connection with critical aquatic area on either the upstream
0: No connection to critical aquatic areas

Channel Modification



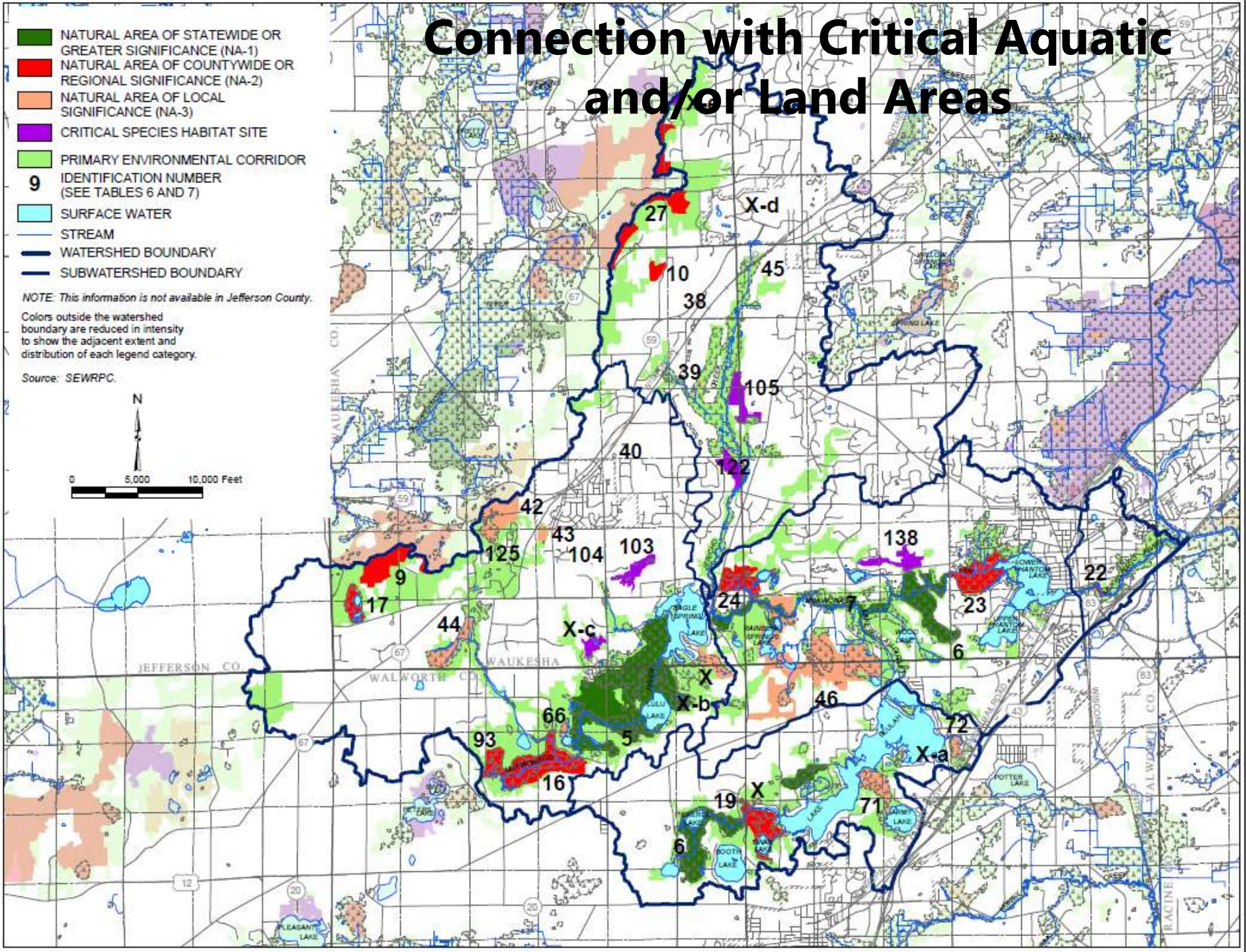
(% imperviousness)

Channelization

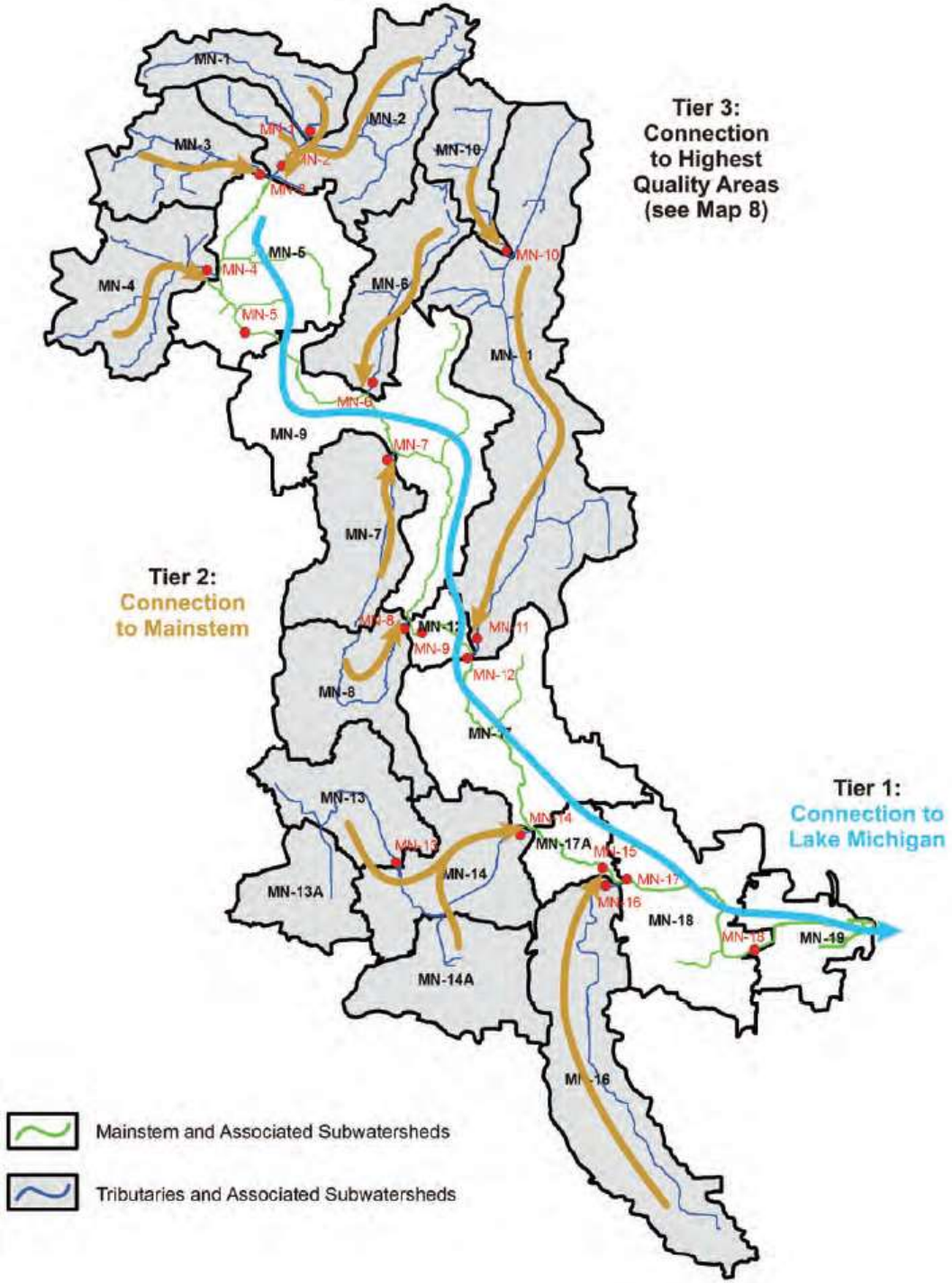
Connection with Critical Aquatic and/or Land Areas

- Upgrade from CSH to NA-3
- Was first proposed as “Utica Lake Tamaracks”
- ~50 acres
- 138 native plant species present. Tamarack seepage swamp supports showy and little yellow lady’s slipper orchids, naked miterwort, starflower, and spikenard.
- Skunk cabbage seeps occur along much of the wetland edge.
- Blandings turtle, common nighthawk, American woodcock, and blue-spotted salamander are present
- Mostly owned by Waukesha County

Connection with Critical Aquatic and/or Land Areas



Instream Three-Tier Prioritization Strategy



Reach Length/ Connectivity

1997-Stream Assessment Criteria

Wildlife

Fish Population and Diversity[c]

+4: Excellent
+2: Good
0: Fair or data not available
-1: Poor

Critical Fish Species

+5: Presence of endangered fish species (may also contain threatened or "special concern" fish species,
+4: Presence of threatened fish species (may also contain "special concern" fish species)
+2: Presence of "special concern" fish species
0: No critical fish species documented

Critical-Aquatic-Amphibian-and-Reptile-Species-Suitable Habitat within or Adjacent to the Stream Channel

+3: Presence of endangered aquatic herptile species habitat (may also contain threatened or "special co herptile species habitat, or both)
+2: Presence of threatened aquatic herptile species habitat (may also contain "special concern" aquatic species habitat)
+1: Presence of "special concern" aquatic herptile species habitat
0: No critical aquatic herptile species habitat

Critical Mussel Species

+5: Presence of endangered mussel species (may also contain threatened or "special concern" mussel s
+4: Presence of threatened mussel species (may also contain "special concern" mussel species)
+2: Presence of "special concern" mussel species
+1: Supports mussel beds of nonlisted mussel species
0: Reach not sampled for mussel species
-1: No presence of mussel species when sampled

1997-Stream Assessment Criteria

Wildlife (continued)

Trout Species Habitat

+2: Class I trout stream

+1: Class II trout stream

0: Class III trout stream or data not available

Biotic Index Rating[d]

+3: Excellent

+2: Very Good

+1: Good

0: Fair or data not available

-1: Poor

-2: Very Poor

Mukwonago River Watershed

- COLD WATER BIOLOGICAL COMMUNITY (CWBC)
- COLD WATER BIOLOGICAL COMMUNITY (CWBC) AND OUTSTANDING RESOURCE WATER
- COLD WATER BIOLOGICAL COMMUNITY (CWBC) AND EXCEPTIONAL RESOURCE WATER
- FISH AND AQUATIC LIFE (FAL)
- SURFACE WATER
- WATERSHED BOUNDARY
- SUBWATERSHED BOUNDARY

Source: SEWRPC.

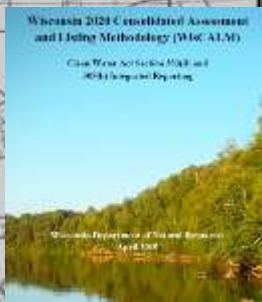
N

0 5,000 10,000 Feet

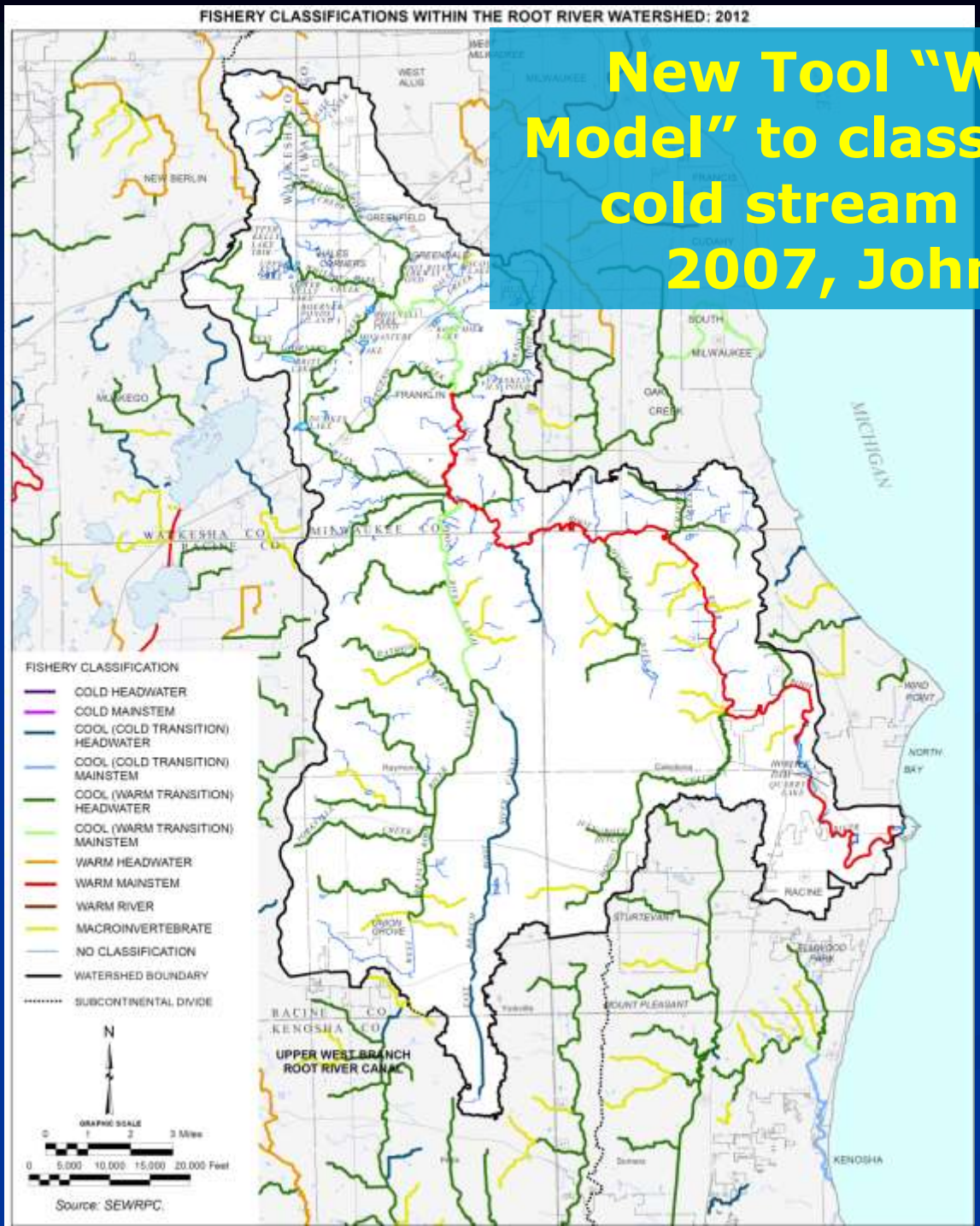
Aquatic Life: Stream and River Classifications

Assignment of designated uses for the protection of fish and aquatic life has been an iterative process dating back to the late 1960's. Many of the designated uses that are included in the Wis. Adm. Code date back to the 1980's. While efforts are underway to revise AL use subcategories, the current codified AL use designation subcategories in ch. NR 102, Wis. Adm. Code will be used for evaluating WQS attainment status, as defined in s. NR 102.04(3), Wis. Adm. Code. Wisconsin's Aquatic Life (AL) use designations for streams and rivers are categorized into the following subcategories:

- **Coldwater (Cold) Community**: Streams capable of supporting a cold-water sport fishery or serving as a spawning area for salmonids and other cold-water fish species. Representative aquatic life communities associated with these waters generally require cold temperatures and concentrations of DO that remain above 6 mg/L. Since these waters are capable of supporting natural reproduction, a minimum DO concentration of 7 mg/L is required during times of active spawning and support of early life stages of newly-hatched fish.
- **Warmwater Sport Fish (WWSF) Community**: Streams capable of supporting a warm water-dependent sport fishery. Representative aquatic life communities associated with these waters generally require cool or warm temperatures and concentrations of DO that do not drop below 5 mg/L.
- **Warmwater Forage Fish (WWFF) Community**: Streams capable of supporting a warm water-dependent forage fishery. Representative aquatic life communities associated with these waters generally require cool or warm temperatures and concentrations of DO that do not drop below 5 mg/L.
- **Limited Forage Fish (LFF) Community**: Streams capable of supporting small populations of forage fish or tolerant macroinvertebrates that are tolerant of organic pollution. Typically limited due to naturally poor water quality or habitat deficiencies. Representative aquatic life communities associated with these waters generally require warm temperatures and concentrations of DO that remain above 3 mg/L.
- **Limited Aquatic Life (LAL) Community**: Streams capable of supporting macroinvertebrates and/or occasionally fish that can tolerate organic pollution. Typically, this category includes small streams with very low-flow and very limited habitat. Certain marshy ditches, concrete line-drainage channels, and other intermittent streams. Representative aquatic life communities associated with these waters are tolerant of many extreme conditions, and require concentrations of DO that remain above 1 mg/L.



Current-Stream Assessment Criteria Elements



New Tool "Wisconsin Stream Model" to classify warm, cool, and cold stream reaches, January 2007, John Lyons, WDNR

New Fish & Invertebrate IBIs and Condition Threshold Categories

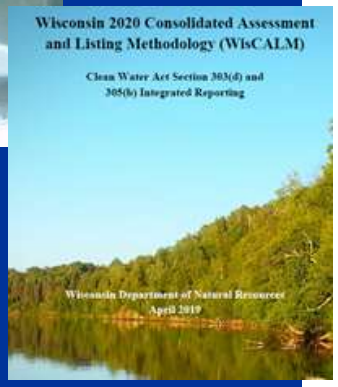


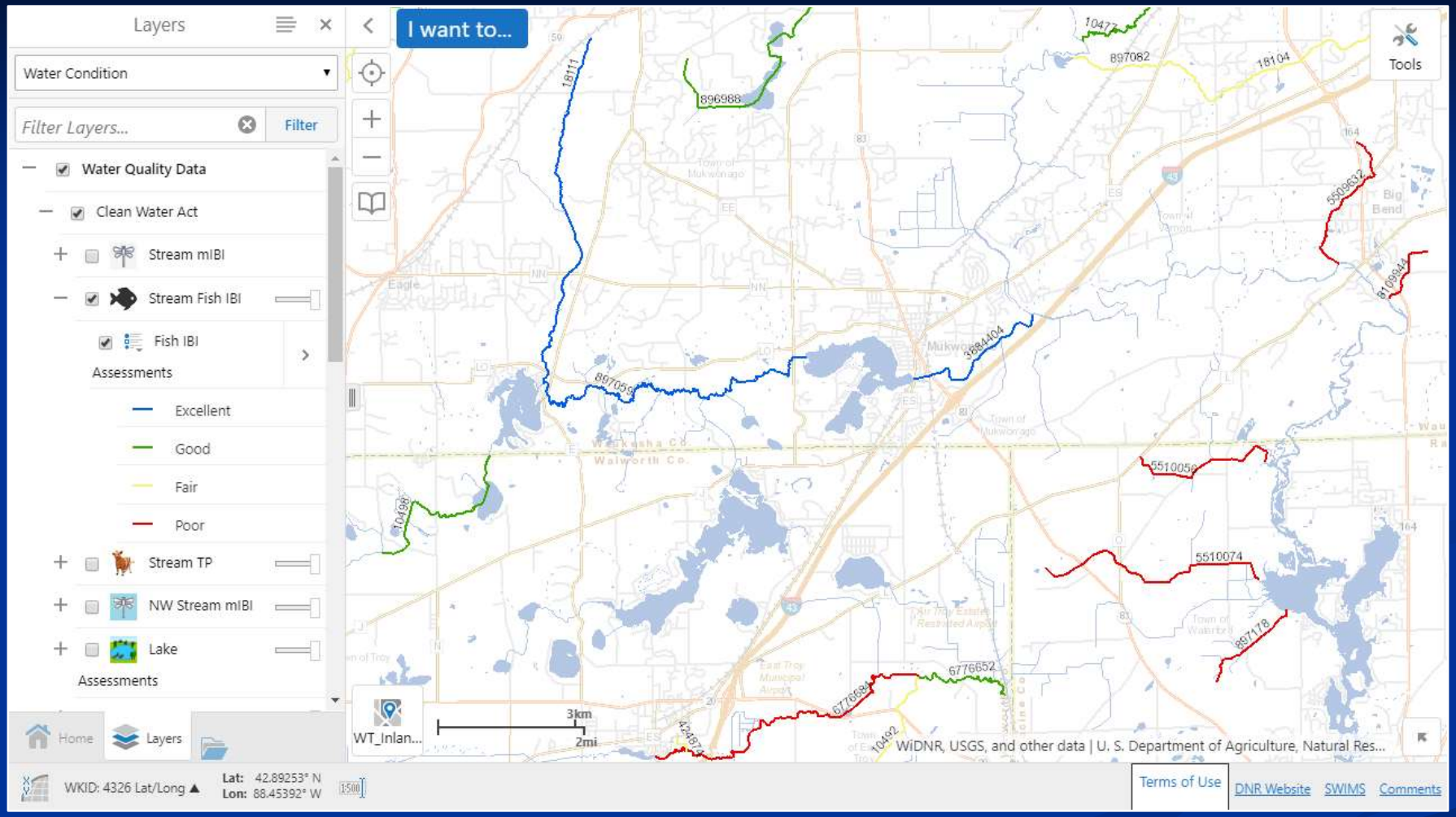
Table 16. Condition category thresholds for applicable fish indices of biotic integrity (IBI).

Natural Community	Fish IBI Type	Fish IBI	Condition Category
Coldwater	Coldwater Fish	81-100	Excellent
		51-80	Good
		21-50	Fair
		0-20	Poor
Cool-Cold or Cool-Warm Headwater	Small-Stream (Intermittent) Fish	91-100	Excellent
		61-90	Good
		31-60	Fair
		0-30	Poor
Cool-Cold Mainstem	Cool-Cold Transition Fish	61-100	Excellent
		41-60	Good
		21-40	Fair
		0-20	Poor
Cool-Warm Mainstem	Cool-Warm Transition Fish	61-100	Excellent
		41-60	Good
		21-40	Fair
		0-20	Poor
Warm Headwater	Small-Stream (Intermittent) Fish	91-100	Excellent
		61-90	Good
		31-60	Fair
		0-30	Poor
Warm Mainstem	Warmwater Fish	66-100	Excellent
		51-65	Good
		31-50	Fair
		0-30	Poor
Large River	River Fish	81-100	Excellent
		61-80	Good
		41-60	Fair
		0-40	Poor

Table 17. Condition category thresholds for wadeable stream macroinvertebrate index of biotic integrity.

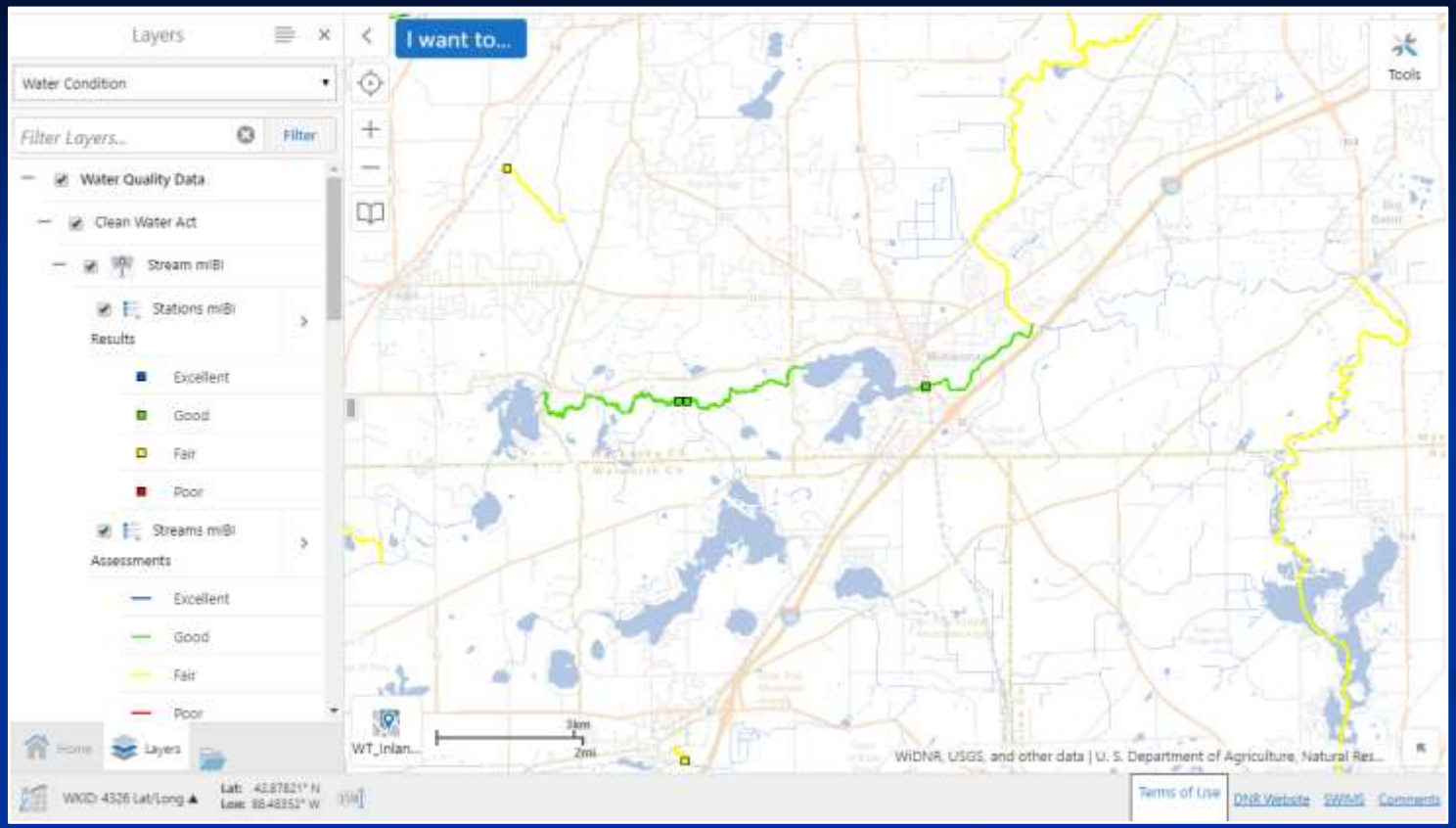
Wadeable Stream M-IBI Thresholds	*Condition Category*
> 7.5	Excellent
5.0-7.4	Good
2.5-4.9	Fair
< 2.5	Poor

Fish Index of Biotic Integrity



- **Developed for range of stream size and thermal conditions (Lyons 1992, 1996, 2001, 2006, 2012)**
  - **Uses stream natural communities to assign appropriate IBIs**
- **IBI Assessments available on Surface Water Data Viewer (SWDV)**
  - **Summary metrics in WDNR Fish Database?**

Macroinvertebrate Index of Biotic Integrity



- **Wadeable streams of Wisconsin (Weigel, 2003)**
  - Uses metrics for taxa richness, tolerance, and feeding morphology
    - For example, % EPT, HBI, % gatherers
  - Specific model developed for Central-Southeast Wisconsin

- **Nonwadeable rivers of Wisconsin (Weigel and Dimick, 2011)**
  - Uses many of the same metrics and adds functional traits
    - For example, thermal and habitat preferences)

- **Assessments available via SWDV; summary metrics available via SWIMS**

Wisconsin Mussel Monitoring Program

Mussel Observations by County

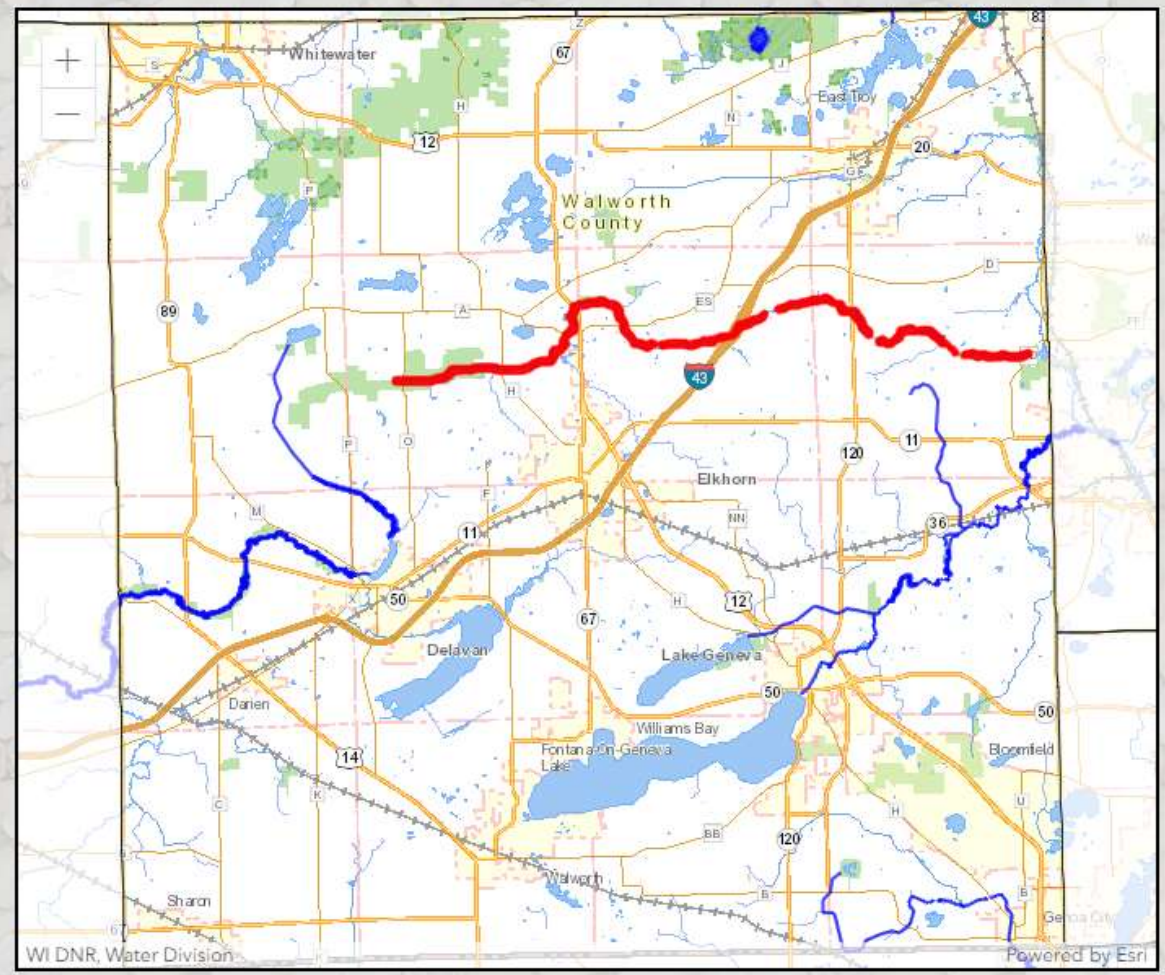
Select County:

Walworth County

(click on waterbody name for list of mussels)
Common Name - *Scientific name* (Last observed date)

Data Last Updated: August 2018

- Como Crk.
- Indian Run Crk.
- Lake Beulah Outlet
- Lulu Lake
- N. Branch Nippersink Crk.
- Sugar Crk.
  - Cylindrical Papershell - *Anodontoides ferussacianus* (1976)
  - Elktoe - *Alasmidonta marginata* (2016)
  - Ellipse - *Venustaconcha ellipsiformis* (2016)
  - Giant Floater - *Pyganodon grandis* (1976)
  - Round Pigtoe - *Pleurobema sintoxia* (2016)
  - Slippershell Mussel - *Alasmidonta viridis* (2007)
  - Wabash Pigtoe - *Fusconaia flava* (1976)
- Turtle Crk.
- Unnamed R.
- White R.



- **Biotic Indices associated on mussels that could be used?**

1997-Stream Assessment Criteria

Buffer

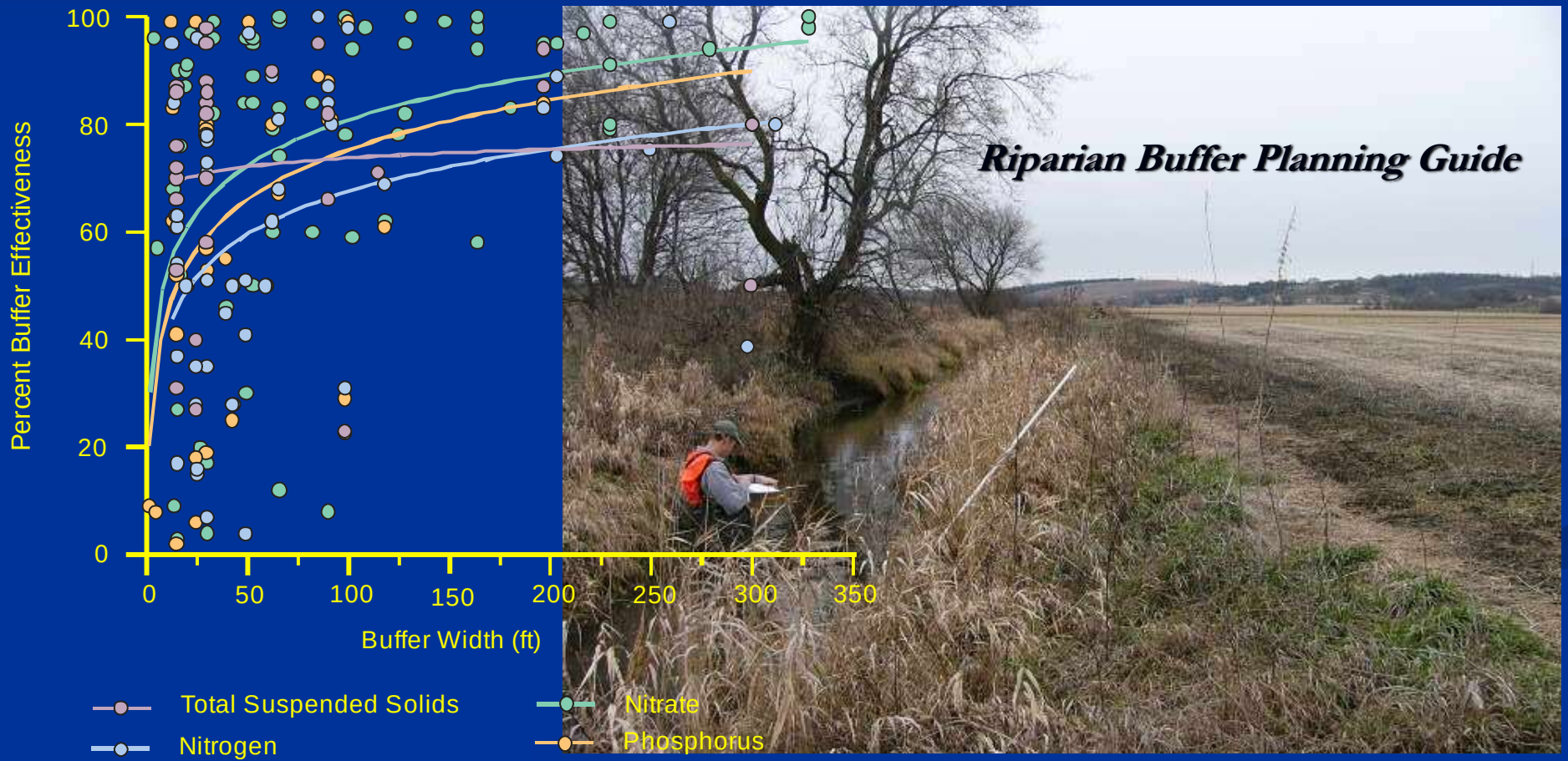
Corridor Encompassing the Stream Channel

+3:	Primary environmental corridor encompassing more than 90 percent of the strea
+2:	Primary environmental corridor encompassing between 50 percent and 90 percer
+1:	Secondary environmental corridor encompassing more than 50 percent of the str
0:	More than 50 percent of the stream channel not encompassed by corridor of any

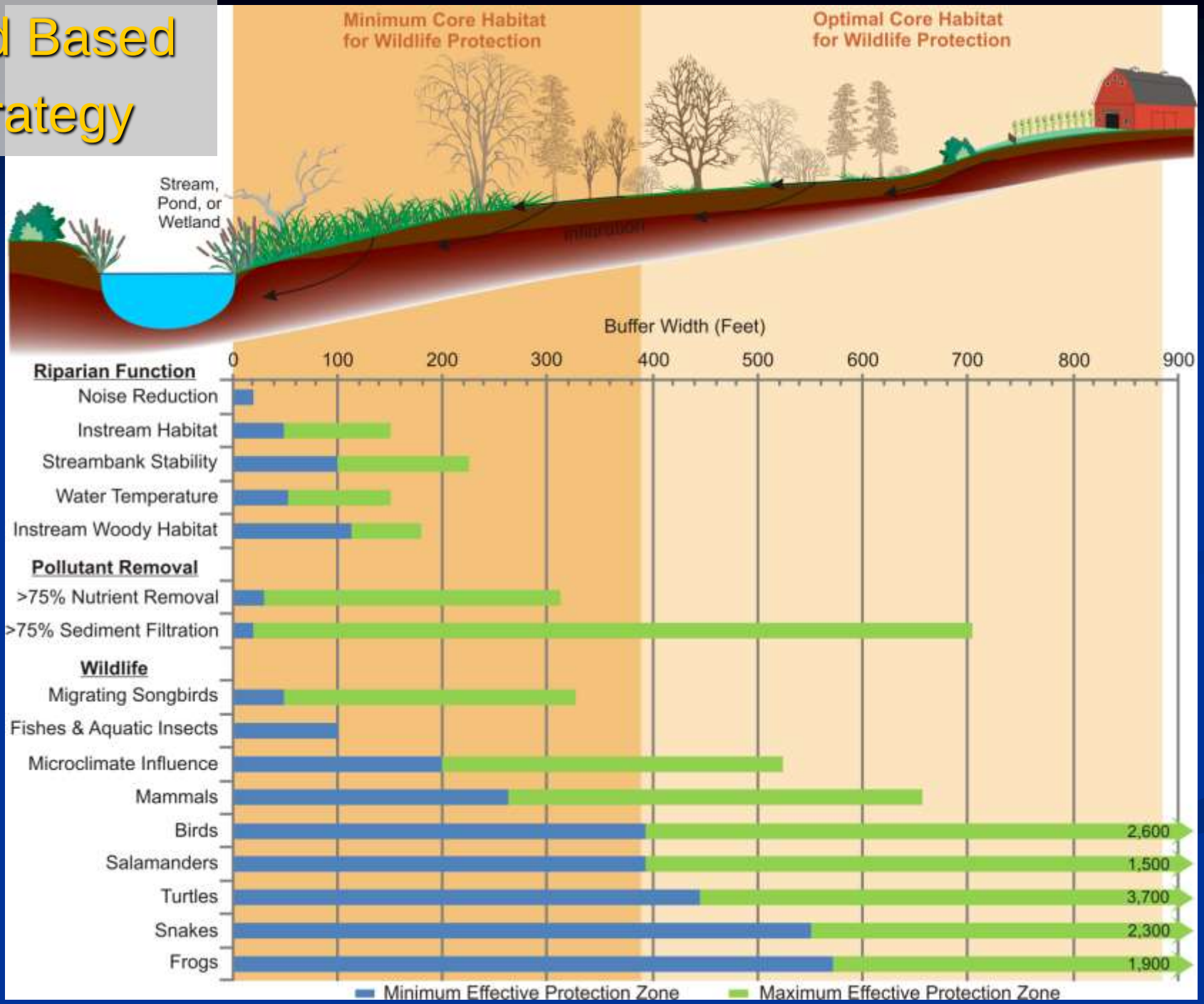
SEWRPC Planning Report No. 50

Appendix O

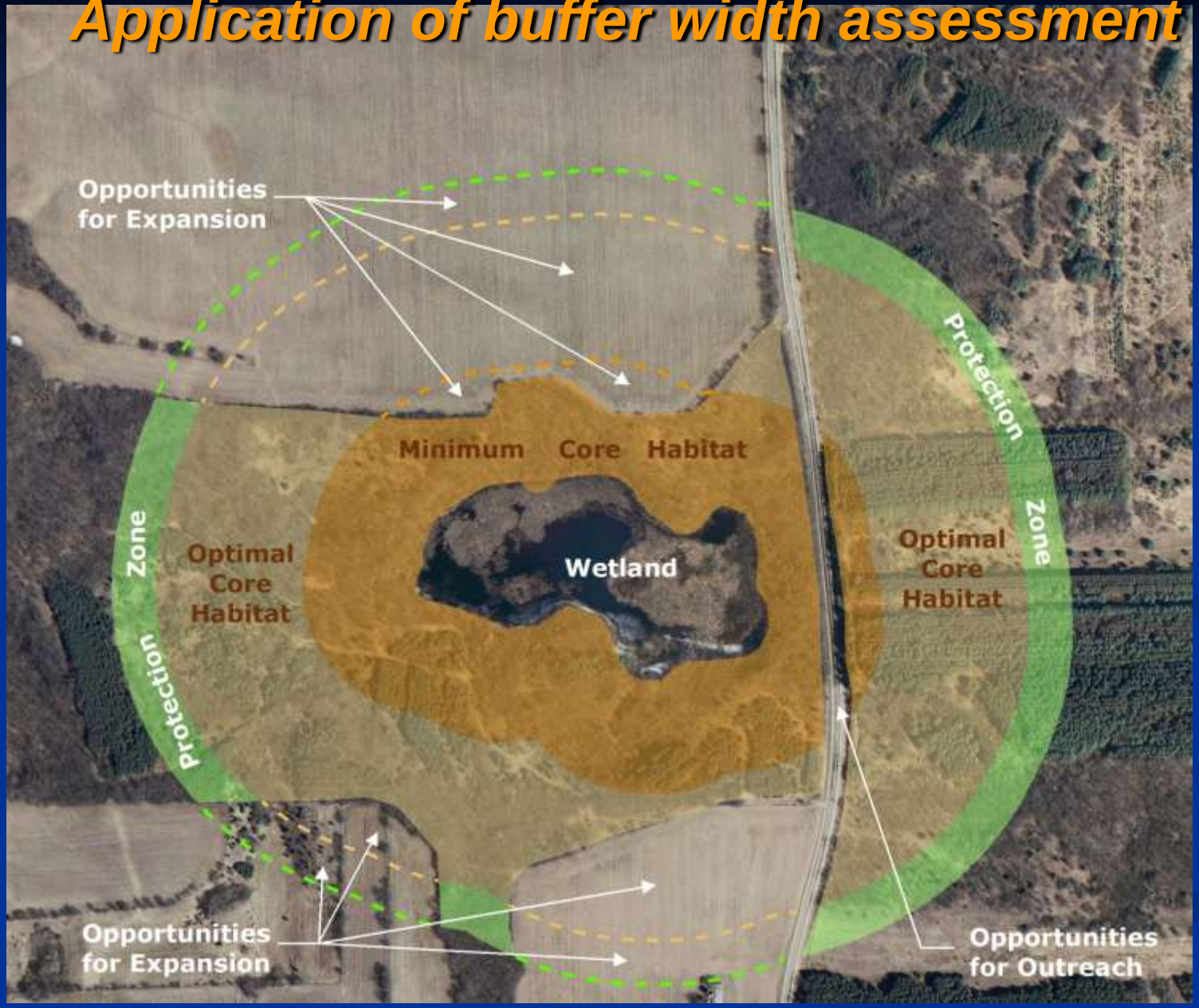
RIPARIAN BUFFER EFFECTIVENESS ANALYSIS



Land Based Strategy



Application of buffer width assessment



See http://www.sewrpc.org/SEWRPC/Environment.htm

1997-Lake Assessment Criteria

Water Quality

Trophic Status (Wisconsin Trophic State Index Values)[a]

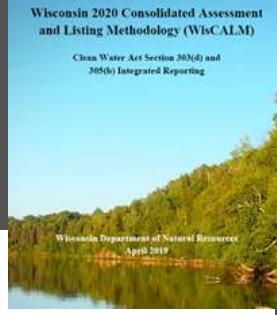
- +5: Below 44 (oligotrophic)
- +4: 44-48 (oligomesotrophic or mildly mesotrophic)
- +3: 49-53 (mesotrophic)
- +2: 54-64 (mesoeutrophic or mildly eutrophic)
- +1: 65-75 (eutrophic)
- 0: Above 75 (hypereutrophic)

Size

Surface-Water Area

- +3: Greater than 100 acres
- +2: 50 to 100 acres
- +1: 10 to 49 acres
- 0: Less than 10 acres

Water Quality/Size



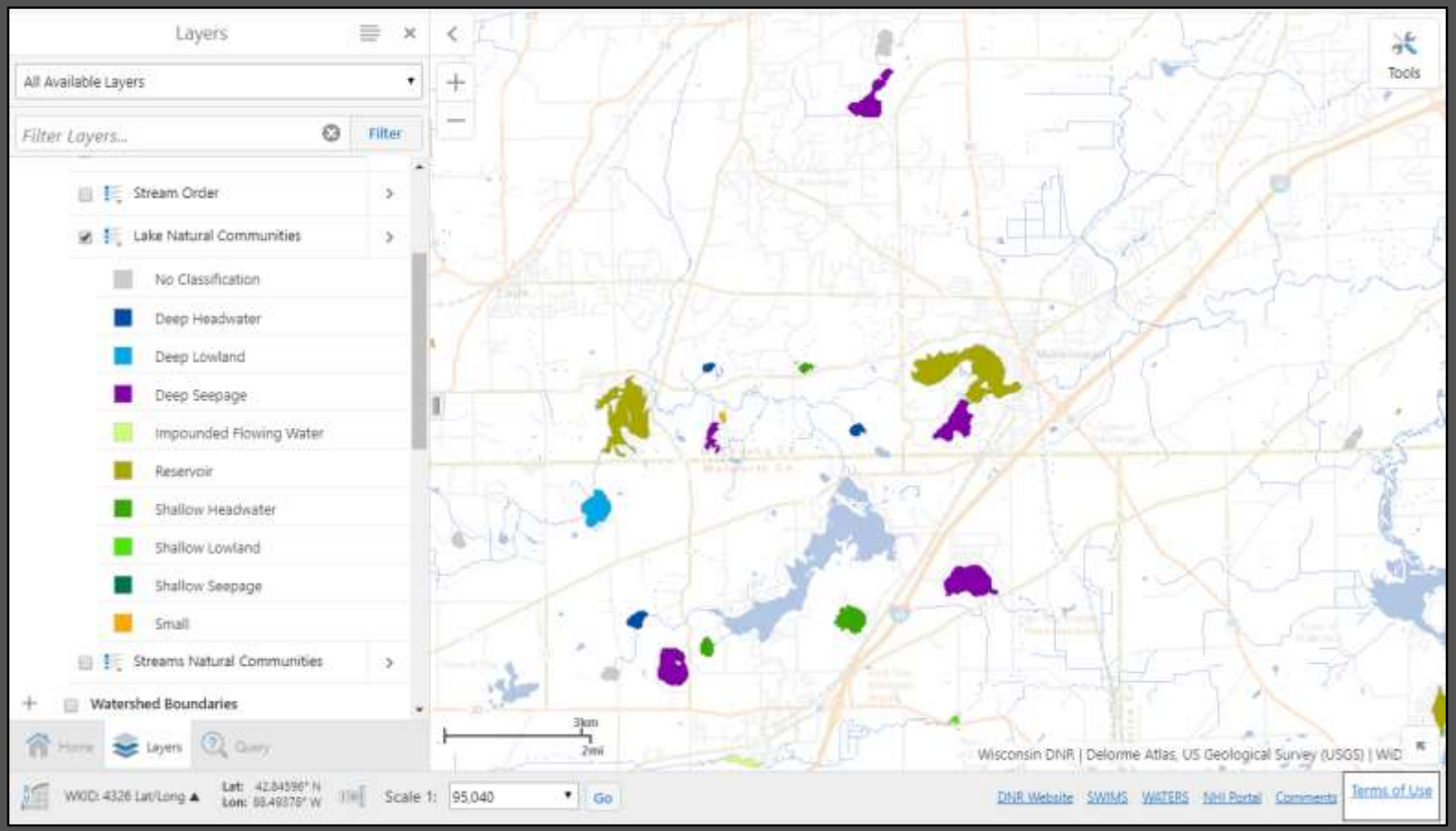
4.1 Lake Classification

WDNR classifies or groups similar lake types based upon physical data. Specifically, lake size, stratification characteristics, hydrology and watershed size are identified as the primary influences on a lake and, to a large degree, these characteristics determine the natural biological communities each lake type supports. Using this information, lakes should fall into one of ten natural community types (Table 4).

Table 4. Lake and reservoir natural communities and defining characteristics.

Natural Community	Stratification Status	Hydrology
Lakes/Reservoirs <10 acres		
• Small	Variable	Any
Lakes/Reservoirs ≥10 acres		
• Shallow Seepage	Mixed	Seepage
• Shallow Headwater		Headwater Drainage
• Shallow Lowland		Lowland Drainage
• Deep Seepage	Stratified	Seepage
• Deep Headwater		Headwater Drainage
• Deep Lowland		Lowland Drainage
Other Classification (any size)		
• Spring Ponds	Variable	Spring Hydrology
• Two-Story Fishery Lakes	Stratified	Any
• Impounded Flowing Waters	Variable	Headwater or Lowland Drainage

Lake Natural Communities



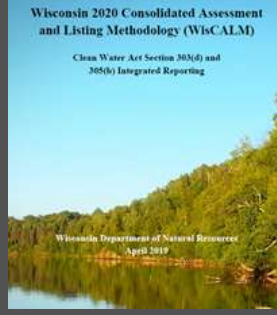
- Based on lake surface area, stratification status, hydrology, and watershed size
  - Data from Register of Waterbodies (ROW), Wisconsin Lake Book, and DNR 24K Hydro database

- Classification data available on SWDV

Lake Natural Communities in the Region

Lake Natural Community	# of Lakes	Percent
Deep Headwater	43	10.2
Deep Lowland	22	5.2
Deep Seepage	29	6.9
Impounded Flowing Water	10	2.4
Reservoir	9	2.1
Shallow Headwater	13	3.1
Shallow Lowland	11	2.6
Shallow Seepage	26	6.2
Small	182	43.2
Two-Story	16	3.8
Not Assigned	60	14.3

Water Quality/Size



Don't forget Impaired Waters….

Table 5. Trophic Status Index (TSI) thresholds – general assessment of lake Natural Communities.

Condition Level	Shallow			Deep			
	Headwater	Lowland	Seepage	Headwater	Lowland	Seepage	Two-Story
Excellent	< 53	< 53	< 45	< 48	< 47	< 43	< 43
Good	53 – 61	53 – 61	45 – 57	48 – 55	47 – 54	43 – 52	43 – 47
Fair	62 – 70	62 – 70	58 – 70	56 – 62	55 – 62	53 – 62	48 – 52
Poor	≥ 71	≥ 71	≥ 71	≥ 63	≥ 63	≥ 63	≥ 53

Note: Although TSI thresholds are not yet available for three natural communities: 1) Small Lakes; 2) Spring Ponds; and 3) Impounded Flowing Waters, by default assessments are completed for the most similar natural community for which thresholds are currently available.

1997-Lake Assessment Criteria

Wildlife

Critical Fish Species

+5: Presence of endangered fish species (may also contain threatened or "spec
+4: Presence of threatened fish species (may also contain "special concern" fis
+2: Presence of "special concern" fish species
0: No critical fish species documented

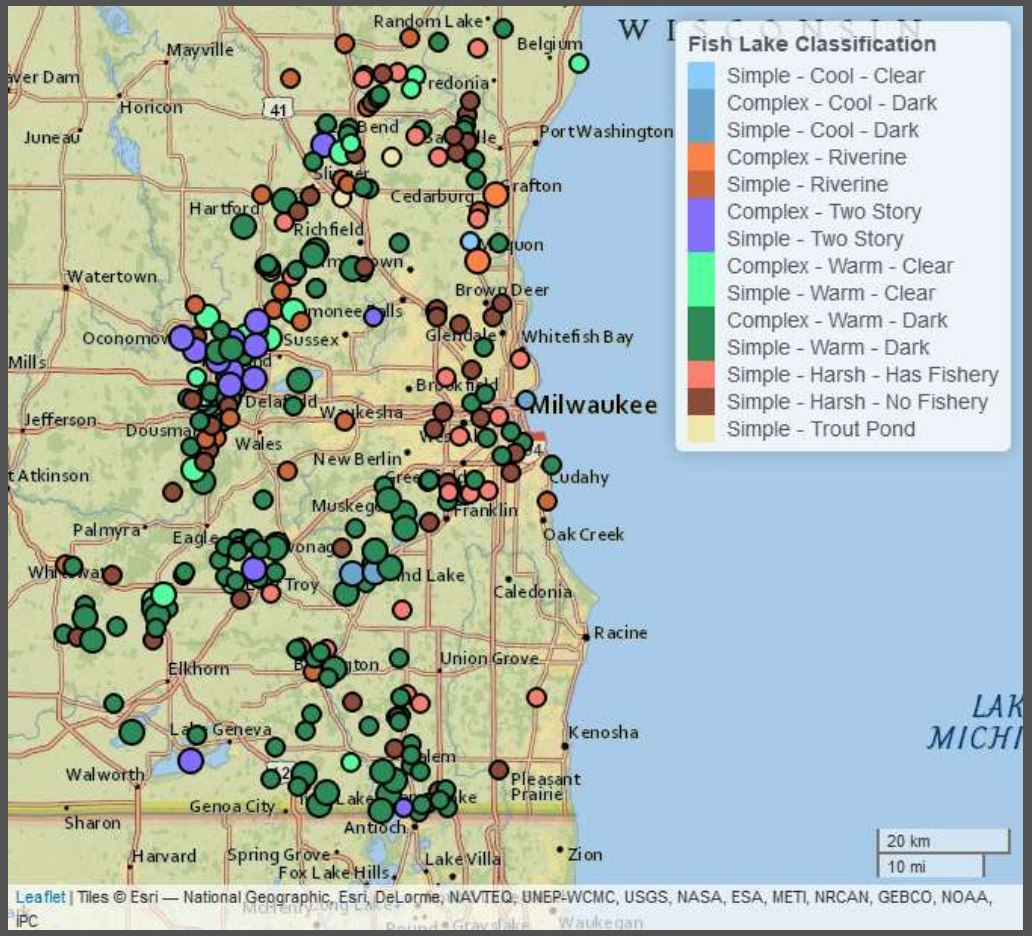
Critical-Aquatic-Amphibian-and-Reptile-Species-Suitable Habitat within or Adjace

+3: Presence of endangered aquatic herptile species habitat (may also contain herptile species habitat, or both)
+2: Presence of threatened aquatic herptile species habitat (may also contain "
+1: Presence of "special concern" aquatic herptile species habitat
0: No critical aquatic herptile species habitat

Wildlife Habitat

+1: Outstanding wildlife habitat
0: Data not available
-1: No outstanding wildlife habitat

Fishery Classification for Lakes



Lake Class	# of Lakes	Percent
Simple - Cool - Clear	1	0.4
Complex - Cool - Dark	2	0.7
Simple - Cool - Dark	1	0.4
Complex - Riverine	2	0.7
Simple - Riverine	22	7.9
Complex - Two Story	13	4.7
Simple - Two Story	3	1.1
Complex - Warm - Clear	9	3.2
Simple - Warm - Clear	11	4
Complex - Warm - Dark	32	11.6
Simple - Warm - Dark	106	38.3
Simple - Harsh - Has Fishery	24	8.7
Simple - Harsh - No Fishery	49	17.7
Simple - Trout Pond	2	0.7

- Two-tiered lake fishery classification model developed by Rypel et al., 2019
  - Classified by sportfish data, then lake temperature, water clarity, and hydrology
  - Provides CPUE and mean size for sportfishes in each lake type

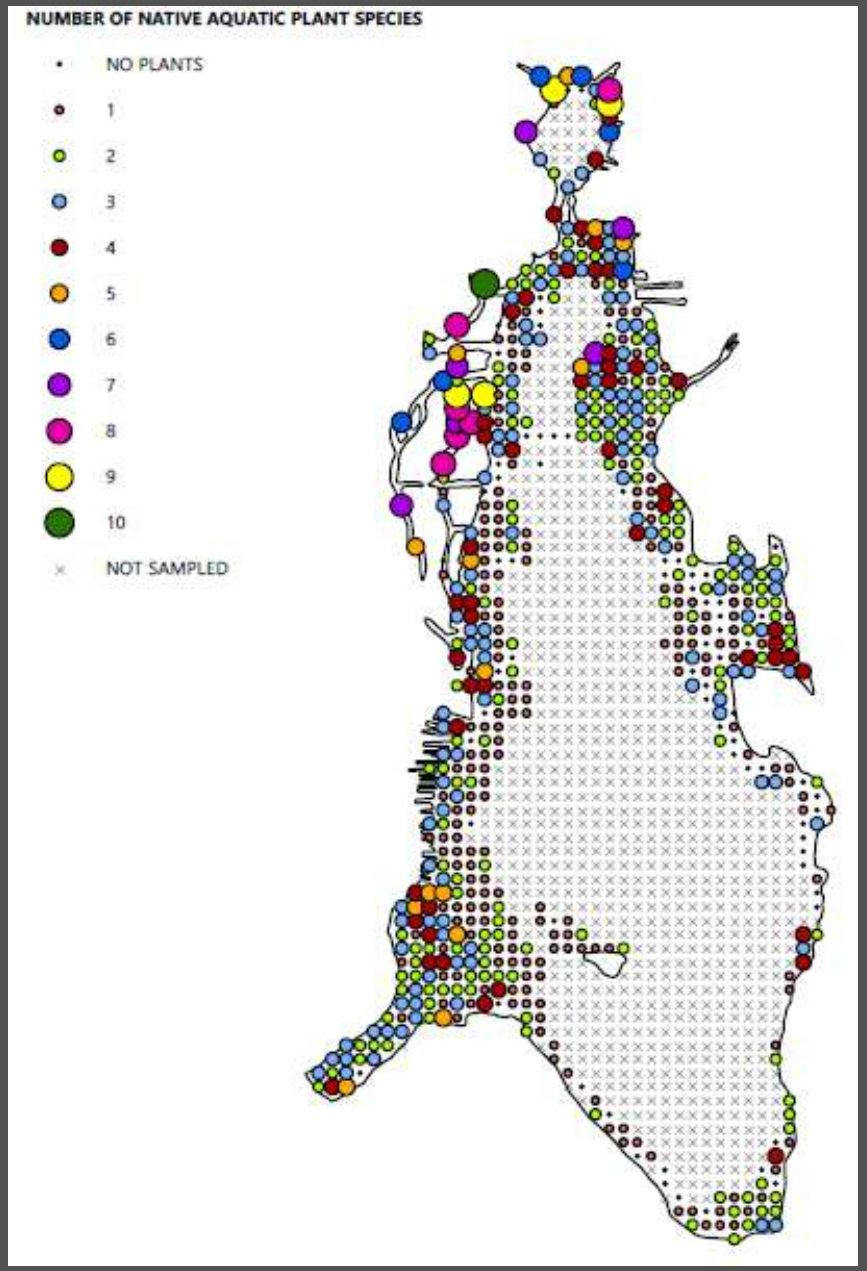
Fishery Classification for Lakes

Lake Class		
No.	Name	Description
1	Complex–Cool–Clear	≥4 sportfish species, low DD, high secchi, low in landscape, these lakes are found primarily in the north, Walleye are an indicator species, Smallmouth Bass can be in high abundance.
2	Complex–Cool–Dark	≥4 sportfish species, low DDs, low secchi, low in landscape, these lakes are found primarily in the north, Walleye are an indicator species, Yellow Perch can be in abundance, can develop quality Northern Pike and/or Muskellunge size structure.
3	Complex–Riverine	≥4 sportfish species, <15 d hydrologic retention time, large watershed areas, often a low secchi, Walleye and other riverine taxa are indicator species, common carp often present.
4	Complex–Two-Story	≥4 sportfish species, large lake area, deep, cold and oxygenated hypolimnetic habitats support coldwater fishes - primarily Cisco, managed differently for phosphorus water quality standards, low in landscape, can develop quality Walleye size structure.
5	Complex–Warm–Clear	≥4 sportfish species, high DD, high secchi, low in landscape, Walleye are an indicator species, Largemouth Bass and Bluegill are in high abundance.
6	Complex–Warm–Dark	≥4 sportfish species, high DD, low secchi, low in landscape, Walleye are an indicator species, Black Crappie can be in abundance, can develop quality Northern Pike and/or Muskellunge size structure.
7	Simple–Cool–Clear	≤3 sportfish species, small lake area, high DD, high secchi, high in landscape, these lakes are found primarily in the north, no Walleye, can develop high numbers of Smallmouth Bass.
8	Simple–Cool–Dark	≤3 sportfish species, small lake area, high DD, low secchi, high in landscape, these lakes are found primarily in the north, no Walleye, can develop high numbers of Black Crappie.
9	Simple–Harsh–Has Fishery	Usually only 1–2 sportfish species, very small lake areas, high in landscape, relatively frequent winterkill, can be dominated by bullheads.
10	Simple–Harsh–No Fishery	Usually no sportfish species present, very small lake areas, high in landscape, frequent winterkills or extremely low pH that prevents most fish populations from persisting. When fishes are present, Central Mudminnow *Umbra limi* and potentially other small-bodied Cyprinidae species dominate.
11	Simple–Riverine	≤3 sportfish species, <15 d hydrologic retention time, small lake area, high DD, small millponds on warmwater streams typify class.
12	Simple–Trout Pond	Shallow, small lake area, groundwater flows reduce water temperatures to support trout fisheries, "spring ponds," these lakes are common in Langlade (epicenter), Menominee, Forest, Shawano, Oconto and Lincoln Counties.
13	Simple–Two-Story	≤3 sportfish species, small lake area, deep, cold and oxygenated hypolimnetic habitats support coldwater fishes, managed differently for phosphorus water quality standards, high in landscape.
14	Simple–Warm–Clear	≤3 sportfish species, small lake area, high DD, high secchi, high in landscape, no Walleye, Largemouth Bass and Bluegill frequently in high abundance.
15	Simple–Warm–Dark	≤3 sportfish species, small lake area, high DD, low secchi, high in landscape, no Walleye, can develop high numbers of Black Crappie.

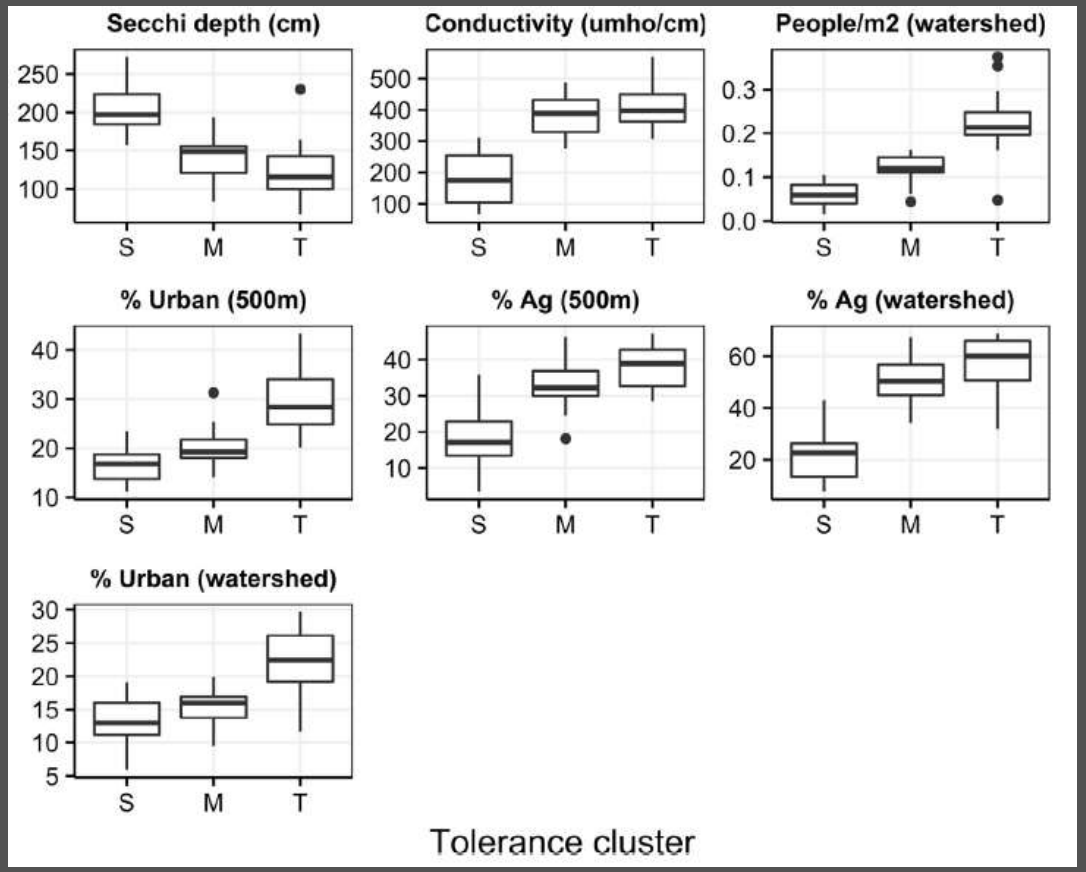
Source: Rypel et al., 2019

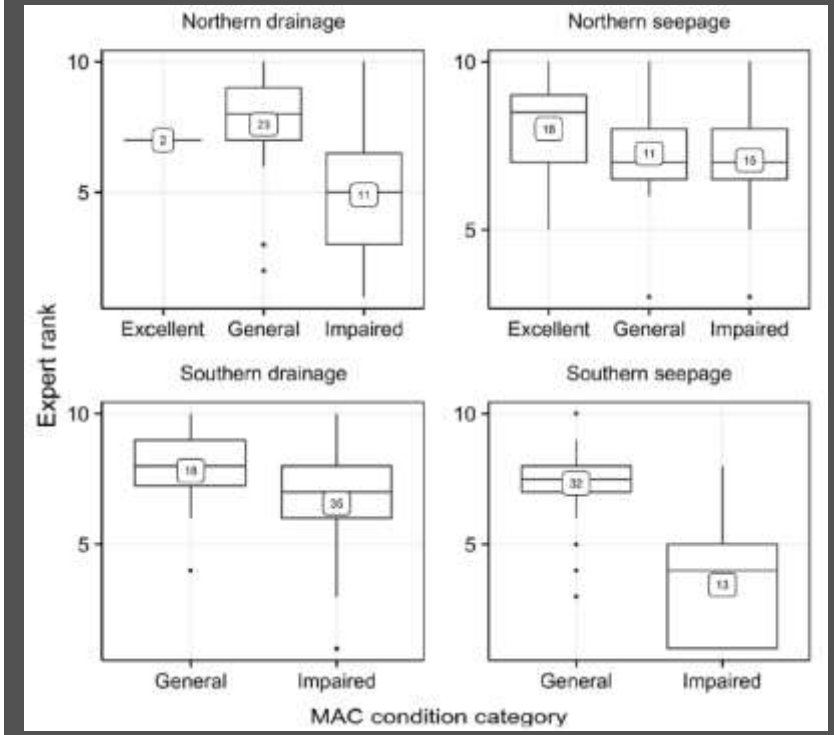
Aquatic Plant Point-Intercept Surveys

- **~140 surveys on 70 waterbodies in Region**
- **Summary metrics from point-intercept surveys to describe aquatic plant community conditions:**
  - Species Richness
  - FQI (or mean C) (Nichols, 1988)
  - Maximum Depth of Colonization
  - Littoral Frequency of Occurrence (FOO)
- **Individual FOO for invasive species**
  - Better representation than presence/absence for determining how "invaded" a waterbody is



Macrophyte Bioassessment for Aquatic Plants in Lakes

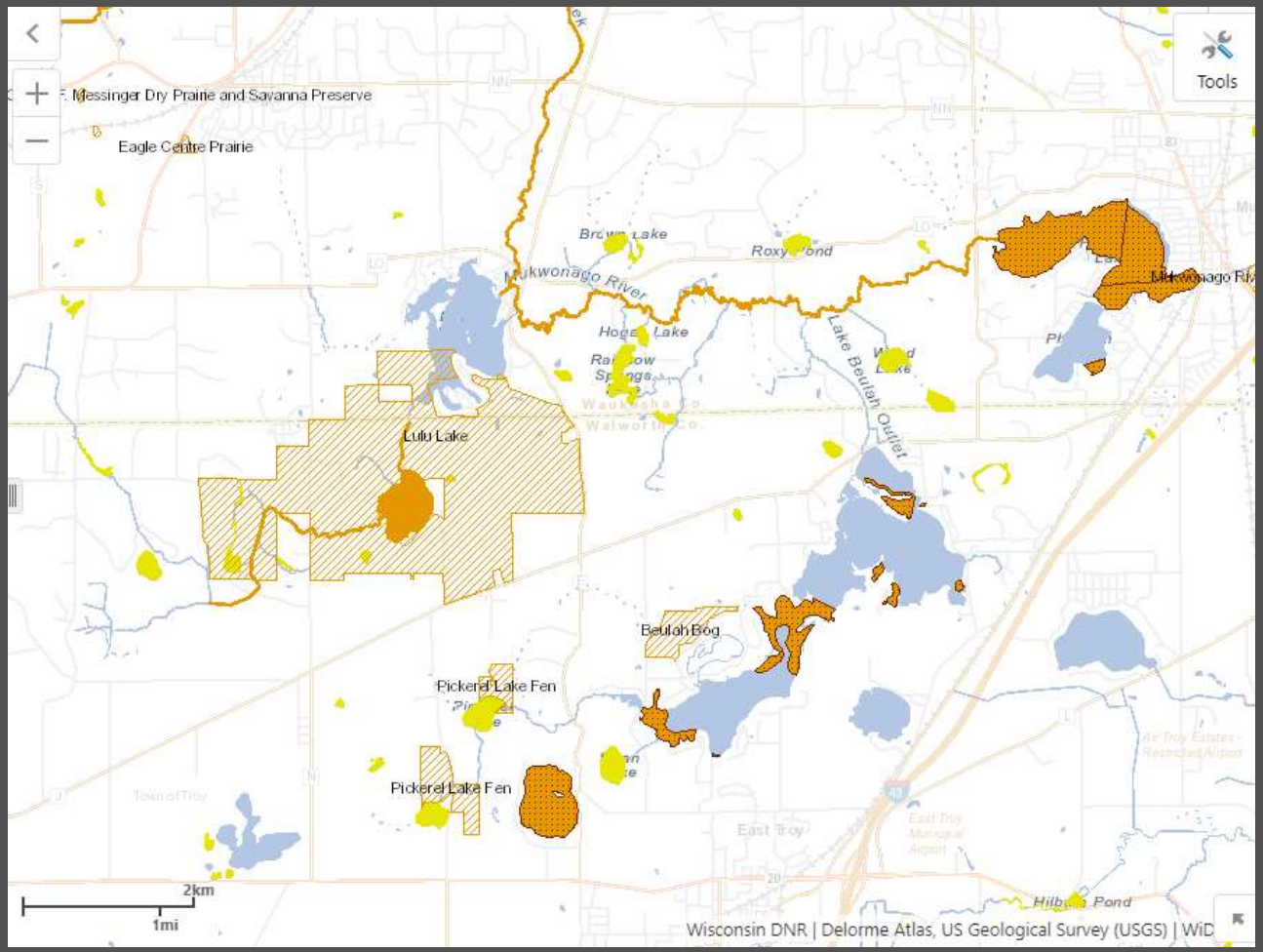




- Macrophyte bioassessment model using lake PI data developed by Mikulyuk et al., 2017
  - Uses species FOO to determine anthropogenic disturbance to plant community
    - Each species assigned a "tolerance" value – Sensitive, Moderate, or Tolerant
  - Lakes grouped by ecotone and hydrology
    - Different rankings for each group

Source: Mikulyuk et al., 2017

WDNR-Designated Sensitive Areas



- Defined as "an area of aquatic vegetation identified by the department as offering critical or unique fish and wildlife habitat, including seasonal or lifestage requirements, or offering water quality or erosion control benefits to the body of water"

- 81 Sensitive Areas on 35 waterbodies in the Region

Mussel or Macroinvertebrate Rankings for Lakes?

- Some mussel observations in lakes on Wisconsin Mussel Monitoring Program iNaturalist page
- Other sources of information?

1997-Lake Assessment Criteria

Buffer

Development of Shoreline

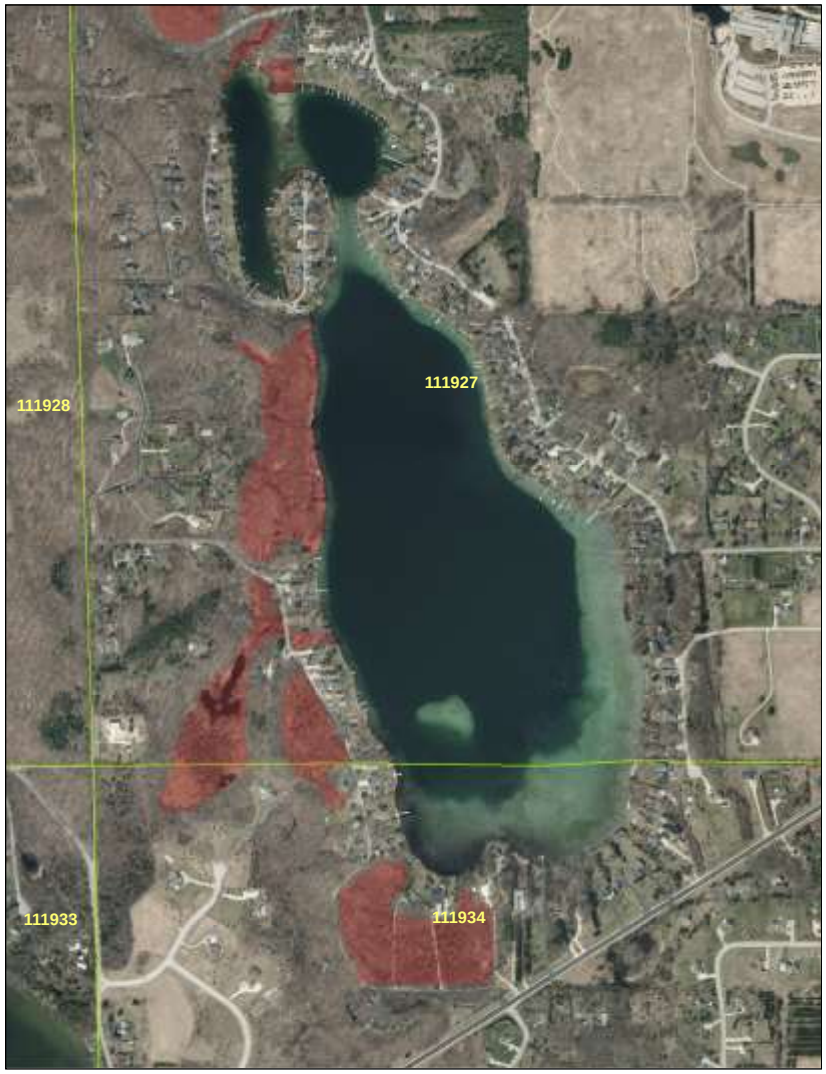
- +3: Less than 5 percent development of shoreline
- +2: 5 percent to 24 percent development of shoreline
- +1: 25 percent to 50 percent development of shoreline
- 0: More than 50 percent development of shoreline

Physical Characteristics

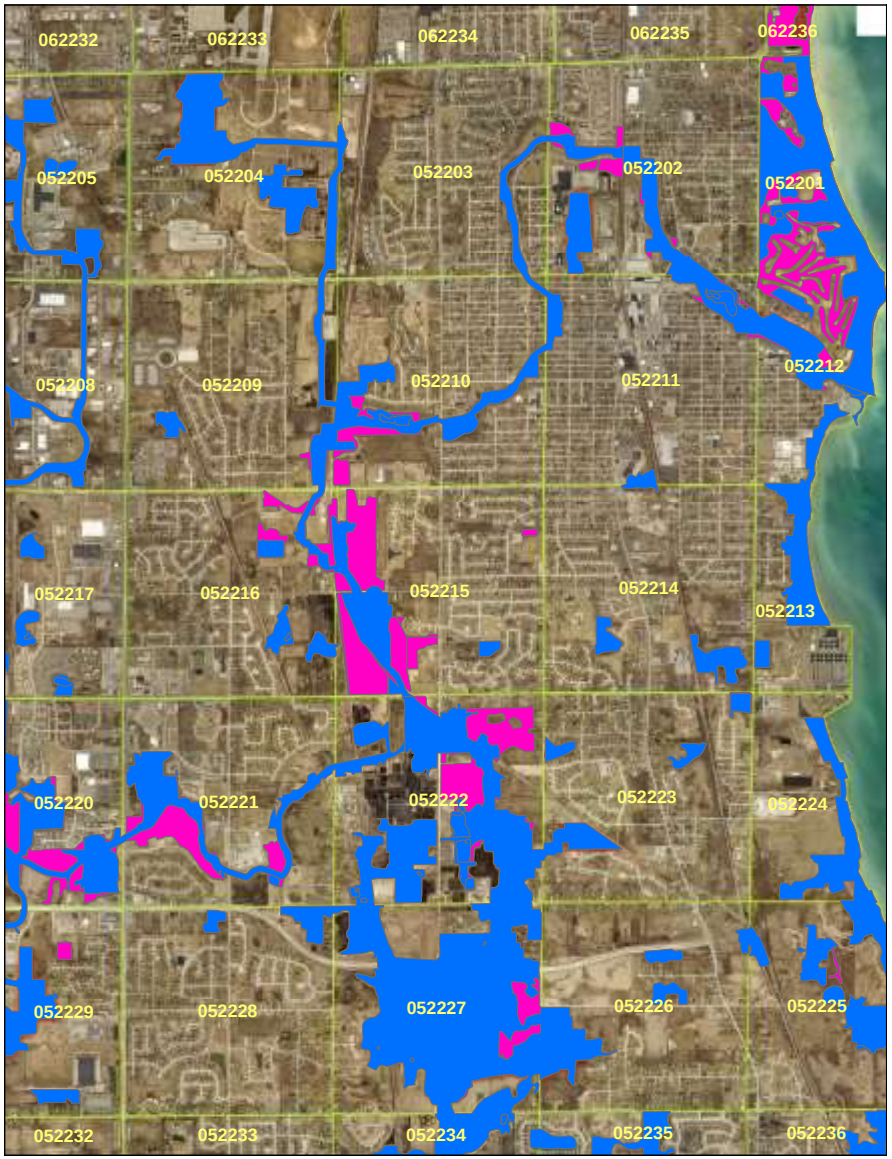
Connection with Critical Aquatic Areas

- +2: Connection to critical aquatic areas at both the inlet and outlet of the lak
- +1: Connection to critical aquatic area at either inlet or outlet of the lake
- 0: No connection to critical aquatic areas

Silver Lake Fen and Tamaracks



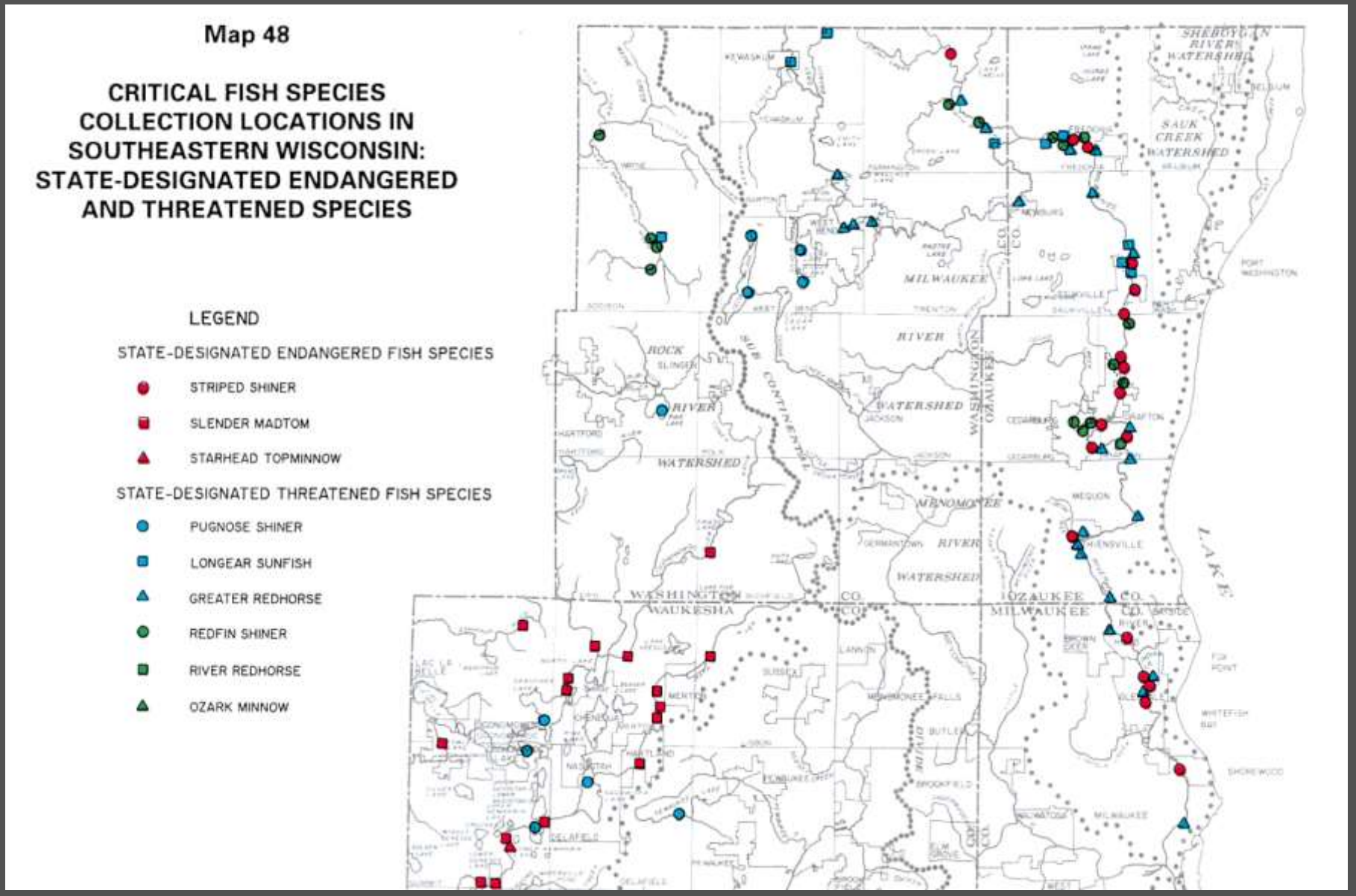
- Upgrade from CSH (Silver Lake Woods and Silver Lake Swamp) to NA-3 and expand
- ~36 acres
- Calcareous fens associated with springs and tamarack swamps around Silver Lake
- Slender bog arrow grass (*Triglochin palustris*), grass of Parnassus (*Parnassia glauca*), Sage willow (*Salix candida*), fen twayblade orchid (*Liparis loeselii*), and green bog orchid (*Platanthera huronensis*) among new species observed
- Recommendation: Private conservation organization



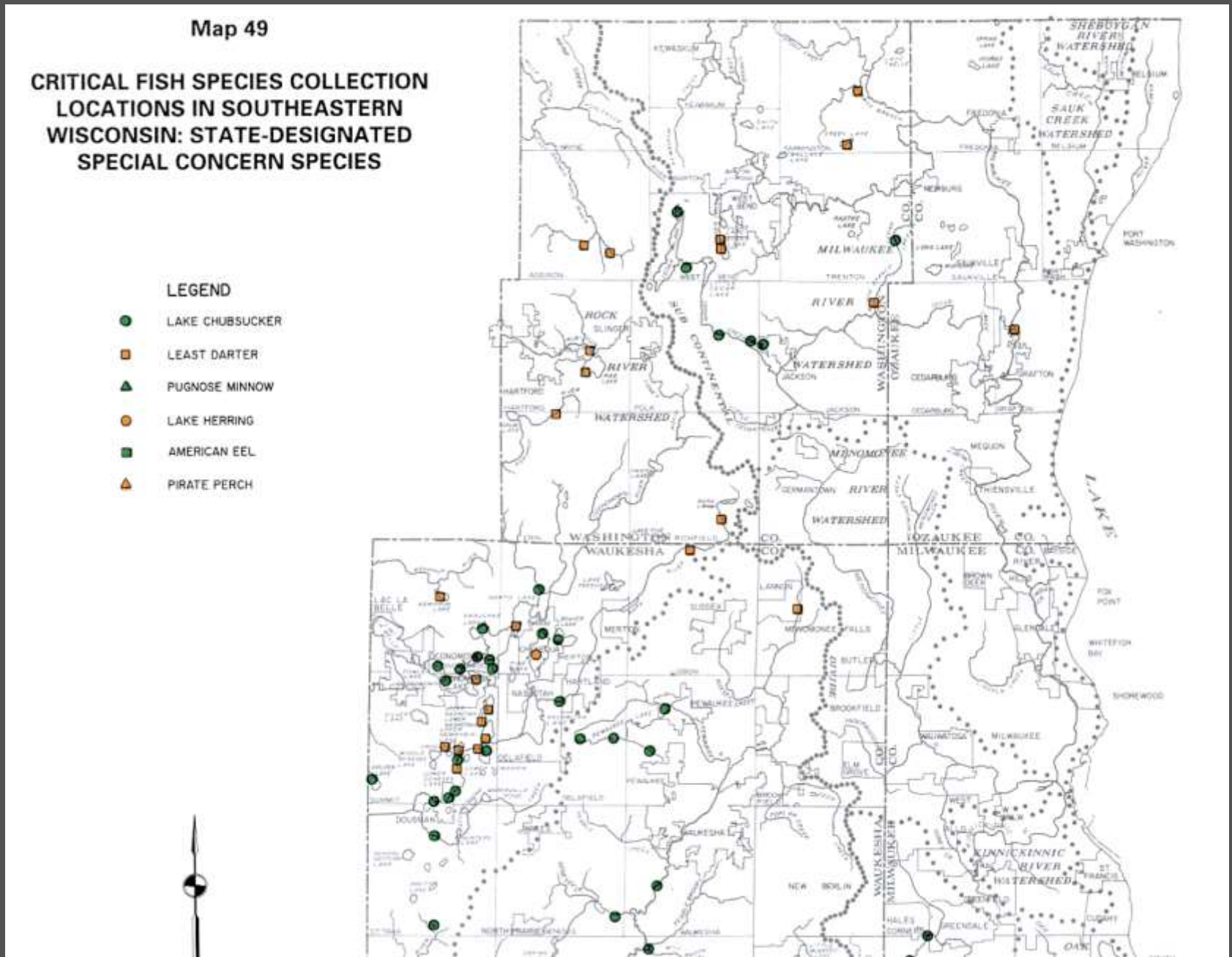
Critical Species Habitats (CSHs) are ballooning based on increasing information availability.

- They look less like discrete sites and more like SEWRPC environmental corridors.
- Reasonably up-to-date data curation on the regional scale is eclipsing our capabilities.
- It is increasingly clear that most uncultivated or un-manicured open space support at least one rare species when all taxonomic groups are considered.
- Rare species data is also curated by the WDNR NHI, but users have difficulty with access, and much rare species data is not reported to absorbed by NHI. New repositories of data are popping up all the time.
- Species designations change, potentially leading to big swings in CSH designations.
- Some users wish to track additional species that aren't rare at the state level.

Critical Fish Species-1997



Critical Fish Species-1997



Critical Fish Species-State Wildlife Action Plan

Establish list of Regionally uncommon aquatic & semi-aquatic Species:

Fish,

Invertebrates,

Herptiles,

Submergent/Floating plants

Proposed Future Meetings: 2020

Feb Mar Apr May June

Apr

draft
Pilot aquatic
Schemes
Regionally
uncommon spp.?

June

completed
aquatic areas
Assessment scheme

Jul Aug Sep Oct Nov Dec

Oct

Full -Regional
application
aquatic areas
Assessment scheme

Thank You

Tom Slawski | Chief Biologist

Justin Poinsatte| Senior Biologist

tslawski@sewrpc.org | 262.953.3263

SEWRPC.org  /SEWRPC  @SEW_RPC